Reaction cross sections for protons on targets from ^{12}C to ^{208}Pb at incident energies between 80 and 200 MeV

Mattias Lantz[1], Noel M. Jacobs[2], Agris Auce[1], Richard F. Carlson[3], Anthony A. Cowley[2], Siegfried V. Foertsch[4], Gregory C. Hillhouse[2], Anders Ingemarsson[1], Roger Johansson[1], Kobus J. Lawrie[4], Mark Schachno[3], Ricky D. Smit[4], Anton Stander[2], Deon F. Steyn[4], Gunnar Tibell[1], JJ van Zyl[2]

[1] *Uppsala University*
[2] *University of Stellenbosch*
[3] *University of Redlands*
[4] *iThemba LABS*

Experimental reaction cross sections of proton scattering from nuclei are implicitly of fundamental importance for our understanding of proton-induced reaction mechanisms, which in turn nowadays find application in chemistry, medicine and astrophysics. These applications are the motivation for the determination of global nucleon optical models which are used to calculate distorted waves in theories that, at any energy, predict scattering and nuclear reactions in the irradiated medium. These global potentials are derived from the vast set of existing experimental data comprising differential cross section angular distributions, polarizations, asymmetries and spin-rotation parameters. However, the derived potentials are not unique and manifest ambiguities. In some cases two potentials can predict almost identical angular distributions and still predict quite different values of the reaction cross section. The reason why reaction cross sections have found limited use as a constraint in the derivation of the global potentials, is the fact that existing data are much less accurate than the data for angular distributions. Furthermore, apart from the lack of reaction cross section data on some important target nuclei, existing experimental data often manifest serious inconsistencies.

Results of new reaction cross section measurements on ^{12}C, ^{40}Ca, ^{90}Zr and ^{208}Pb at incident proton energies in the important range of 80 to 200 MeV will be presented. The accuracy of the new data compared to existing measurements will be discussed.

Email: lantz@tsl.uu.se